PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 20310999KC	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. **PCT/SG2003/000190**	International Filing Date *(day/month/year)* 8 August 2003	Priority Date *(day/month/year)* 16 August 2002
International Patent Classification (IPC) or national classification and IPC **Int. Cl.** [7] F24C 15/20, B08B 15/02		
Applicant SO, Kim Lui		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   [X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 5 sheet(s).

3. This report contains indications relating to the following items:

   - I [X] Basis of the report
   - II [ ] Priority
   - III [ ] Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV [ ] Lack of unity of invention
   - V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI [ ] Certain documents cited
   - VII [ ] Certain defects in the international application
   - VIII [ ] Certain observations on the international application

Date of submission of the demand 6 February 2004	Date of completion of the report 29 June 2004
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer **PETER T. WEST** Telephone No. (02) 6283 2108

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SG2003/000190

I. Basis of the report

1. With regard to the **elements** of the international application:*

- [ ] the international application as originally filed.
- [X] the description, pages **1 to 11** , as originally filed,
  pages , filed with the demand,
  pages , received on with the letter of
- [X] the claims, pages , as originally filed,
  pages , as amended (together with any statement) under Article 19,
  pages **12 to 16** , filed with the demand,
  pages , received on with the letter of
- [X] the drawings, pages **1 to 5** , as originally filed,
  pages , filed with the demand,
  pages , received on with the letter of
- [ ] the sequence listing part of the description:
  pages , as originally filed
  pages , filed with the demand
  pages , received on with the letter of

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

- [ ] the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- [ ] the language of publication of the international application (under Rule 48.3(b)).
- [ ] the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- [ ] contained in the international application in written form.
- [ ] filed together with the international application in computer readable form.
- [ ] furnished subsequently to this Authority in written form.
- [ ] furnished subsequently to this Authority in computer readable form.
- [ ] The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- [ ] The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. [ ] The amendments have resulted in the cancellation of:
   - [ ] the description, pages
   - [ ] the claims, Nos.
   - [ ] the drawings, sheets/fig.

5. [ ] This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	**1 to 39**	**YES**
	Claims		**NO**
Inventive step (IS)	Claims	**1 to 39**	**YES**
	Claims		**NO**
Industrial applicability (IA)	Claims	**1 to 39**	**YES**
	Claims		**NO**

2. Citations and explanations (Rule 70.7)

The following documents identified in the International Search Report have been considered for the purposes of this report:

D1 EP 29807 A1 (H. GIOVANNA S.A.) 3 June 1981
D2 DE 19509611 A1 (RENTSCHLER REVEN-LUFTUNGSSYSTEME GmbH) 19 September 1996
D3 WO 95/18943 A2 (LDI MFG. CO., INC.) 13 July 1995
D4 WO 93/18348 A1 (FAUTEUX) 16 September 1993
D5 GB 2139750 A (GLENN CHAN & PARTNERS LTD (HONG KONG))14 November 1984
D6 US 5359990 A (HSU) 1 November 1994

Novelty (N)

Document D1 discloses that the sprays spray directly onto the filter 12, this precludes that the spray is drawn along the path of the airflow onto the filter as defined in each of these claims, and hence this document is not relevant to any of these claims with regard to novelty.

Each of documents D2, D4 and D6 each also disclose arrangements in which sprays spray directly onto filters, and hence these document are not relevant to any of claims 1, 17 and 19 with regard to novelty for the same reason as D1.

Document D3 discloses a spray located after a first filter with which it does not interact, therefore this document is not relevant to any of claims 1, 17 or 19 with regard to novelty.

Document D5 discloses a spray nozzle 5 producing a water screen located in the air path before a baffle 11, however there is no interaction between the spray and the baffle with the spray being directed away from the baffle and into to a reservoir 8. Although this document discloses a suction fan here is no disclosure that the spray is drawn along the path of the airflow onto a filter as defined in each of these claims, and hence this document is also not relevant to any of claims 1, 17 and 19 with regard to novelty.

Appended claims 2 to 16, 18 and 20 to 39 add further features to those defined in claim 1 and are therefore also novel.

Therefore the subject matter of claims 1 to 39 is new and meets the requirements of Article 33(2) PCT with regard to novelty.

[Continued in Supplemental Box]

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of : Box V

Inventive Step (IS)

The claimed invention is not obvious in the light of any of the cited documents nor is it disclosed in any obvious combination of them. It is also considered that it would not be obvious to a person skilled in the art in the light of common general knowledge either by itself or in combination with any of these documents.

In particular it is considered that it would not be obvious for a person skilled in the art to arrange a first spray in relation to a first filter to enable the spray to be drawn along the air flow path into the filter. The cited prior art teaches away from such an arrangement in that it discloses either the spray being sprayed directly onto the filter so as to actively wash it or being directed away from the filter to avoid wetting it. This arrangement is present in each of independent claims 1, 17 and 19 and provides an unifying inventive concept between them.

Therefore the subject matter of claims 1 to 39 is not obvious and meets the requirements of Article 33(3) PCT with regard to inventive step.

The claims:

1. A self-cleaning exhaust system including:

a first filter in a path for an air flow;

a first spray outlet for providing a first spray into the air flow before the first filter to enable the first spray to be drawn along the path onto a first surface of the first filter;

a second filter in the path for the air flow;

wherein the first spray has droplets of a size being able to combine with droplets of a contaminant to form combined droplets in the air flow before the first filter to assist the combined droplets being captured by the first filter, and wherein the first filter is a relatively coarse filter and the second filter is a relatively fine filter.

2. A self-cleaning exhaust system as claimed in claim 1, further including a second spray outlet located in said air flow path after said first filter for providing a second cleaning spray onto a rear surface of said first filter.

3. A self-cleaning exhaust system as claimed in either claim 1 or 2, wherein the first spray outlet is at least one nozzle for providing a fine spray and the second spray outlet is at least one further nozzle for providing a coarse spray wherein the combined droplets in the air flow remain fluid.

4. A self cleaning exhaust system as claimed in any one of claims 1 to 3, wherein the first filter and the second filter are in an exhaust hood.

5. A self-cleaning exhaust system as claimed in claim 4, wherein the exhaust hood includes a top, a front wall, a rear wall, and side walls extending between the rear wall and the front wall; there being provided a baffle depending from the top intermediate the front wall and the rear wall.

6. A self-cleaning exhaust system as claimed in claim 5, wherein both the first and second filters are mountable to one of the front wall and the rear wall and the baffle extends between the one of the front wall and the rear wall.

7. A self-cleaning exhaust system as claimed in claim 5 or claim 6, including a plate extending forwardly from the one of the front wall and the rear wall beyond the baffle.

8. A self-cleaning exhaust system as claimed in claim 7, wherein the plate has an upwardly directed projection extending between the baffle and the one of the front wall and the rear wall.

9. A self-cleaning exhaust system as claimed in claim 8, wherein the projection extends upwardly to a height at least as high as the mounting of the first filter to the baffle.

10. A self-cleaning exhaust system as claimed in any one of claims 7 to 9, wherein the first spray outlet is mounted on the plate.

11. A self-cleaning exhaust system as claimed in any one of claims 5 to 10, wherein the second nozzle is mounted on the one of the front wall and the rear wall.

12. A self-cleaning exhaust system as claimed in any one of claims 1 to 11, wherein the first filter is inclined with respect to the path, and covers the path.

13. A self-cleaning exhaust system as claimed in any one of claims 1 to 12, wherein the second filter is inclined with respect to the path, and covers the path.

14. A self-cleaning exhaust system as claimed in claim 13 when appended to claim 12, wherein the first filter is at an angle of inclination to the path substantially the same as that of the second filter.

15. A self-cleaning exhaust system as claimed in any one of claims 1 to 14, further including a tank for containing a cleaning solution for the cleaning sprays.

16. A self-cleaning exhaust system as claimed in claim 15, wherein the cleaning liquid includes water and a degreaser in a required ratio in the range 1:10 to 1:50.

17. A self-cleaning exhaust system including a first filter for filtering contaminants from an air flow along on air flow path, a first spray outlet for providing a fine, first spray of a cleaning solution into the air flow before the first filter to enable the fine, first spray to be drawn into the first filter by the air flow, and a plate for preventing the first spray from moving against the air flow.

18. A self-cleaning exhaust system as claimed in claim 17, wherein the plate is mounted below the first filter and includes an upwardly directed projection at an end of the plate.

19. A method of removing at least one contaminant in an exhaust system including:

providing a first spray into an air flow before a first filter, the first filter being mounted in a path of the air flow to enable the first spray to be drawn along the path onto the first filter,

the first spray being able to combine with droplets of the contaminant in the air flow before the first filter; and

the first spray being able to coat the first filter to assist the first filter in capturing at least one droplet of the contaminant in the air.

20. A method as claimed in claim 19, wherein the first spray is drawn along the path under the influence of the air flow, and the air flow causes at least a part of the first spray to pass through the first filter.

21. A method as claimed in claim 19 or claim 20, including providing a second spray into the air flow after the first filter.

22. A method as claimed in any one of claims 19 to 21, wherein there the second spray is for cleaning a second filter in said airflow path after said first filter.

23. A method as claimed in any one of claims 19 to 21, wherein there the second spray is for cleaning a rear surface of the first filter, and for being drawn under the influence of the airflow to clean a second filter in said airflow path after said first filter.

24. A method as claimed in claim 22 or claim 23, wherein the first filter is a relatively coarse filter, the second filter is a relatively fine filter, the first spray is a relatively fine spray and the second spray is a relatively coarse spray.

25. A method as claimed in any one of claims 19 to 24, wherein the first spray is from a first spray outlet and the second spray is from a second spray outlet, each of the first spray outlet and the second spray outlet being at least one nozzle.

26. A method as claimed in any one of claims 22 to 25, wherein the second spray substantially coats the second filter to assist the second filter in capturing the at least one contaminant.

27. A method as claimed in any one of claims 19 to 26, wherein the first filter and the second filter are in an exhaust hood.

28. A method as claimed in claim 27, wherein the exhaust hood includes a top, a front wall, a rear wall, and side walls extending between the rear wall and the front wall; there being provided a baffle depending from the top intermediate the front wall and the rear wall.

29. A method as claimed in claim 28, wherein both the first and second filters are mountable to one of the front wall and the rear wall and the baffle extends between the baffle and the one of the front wall and the rear wall; there being a plate extending forwardly from the one of the front wall and the rear wall beyond the baffle.

30. A method as claimed in claim 29, wherein the plate has an upwardly directed projection extending between the baffle and the one of the front wall and the rear wall; the projection extending upwardly to a height at least as high as the mounting of the first filter to the baffle; the plate preventing the first spray from moving against the air flow out of the exhaust hood.

31. A method as claimed in claim 29 or claim 30, wherein the first spray outlet is mounted on the plate and the second spray outlet is mounted on the one of the front wall and the rear wall.

32. A method as claimed in any one of claims 19 to 31, wherein the first spray has droplets of a size to combine with droplets of the contaminant to form combined droplets, and to assist the combined droplets being captured by the first filter.

33. A method as claimed in any one of claims 19 to 32, wherein the nature and mesh size of the first filter, and of any additives to the first spray, is determined by the nature of the contaminant.

34. A method as claimed in any one of claims 19 to 33, wherein the nature and mesh size of the second filter, and of any additives to the second spray, is determined by the nature of the contaminant.

35. Apparatus as claimed in any one of claims 1 to 18, wherein the first spray outlet is located within the first filter.

36. Apparatus as claimed in any one of claims 1 to 18 and claim 35, wherein the second spray outlet is located within the second filter.

37. A method as claimed in any one of claims 19 to 34, wherein the first spray outlet is located within the first filter.

38. A method as claimed in any one of claims 19 to 34 and claim 37, wherein the second spray outlet is located within the second filter.

39. A self-cleaning exhaust system as claimed in any one of claims 1 to 18, wherein the system will not operate unless there is air flow through the system.